Radiological protection of the environment from an NGO perspective

Simon Carroll[1]

[1] *Gruvbacken 2-5tr, SE-116 34 Stockholm, Sweden.*

INTRODUCTION

Non-governmental environmental organisations (environmental NGOs) may consider the issue of radiological protection of the environment differently to other interested parties such as regulators or industry. While environmental NGOs are broadly positive towards the current emphasis and engagement on radiological protection of the environment *per se*, there remain concerns about the precise meaning of the term and the ultimate objectives of the current initiatives.

WHAT IS MEANT BY "PROTECTION OF THE ENVIRONMENT"?

There is as yet no clear common understanding of what is meant by "radiological protection of the environment". This matters, because what is understood by the term will affect fundamentally the type of system considered necessary and appropriate and the tools needed to implement it.

Despite the evidence from other fields of human activities showing that protecting man does not automatically imply protection of the environment, there are those involved in radiological protection who consider the assertion that "*if man is adequately protected then other living things are also likely to be sufficiently protected*" (ICRP, 1977) remains valid (WNA, 2007). However, even if the statement might be considered generally applicable where "environment" is confined to the human habitat, the assertion would seem not to hold true under all circumstances, for example where human populations are non-existent or far-removed. Moreover there is growing recognition that the current system of radiological protection fails to demonstrate that the environment is not harmed. Management of radioactive waste and releases to the environment also are increasingly being addressed in contexts requiring "an acceptable level of protection of the environment" and "environmentally acceptable solutions" going beyond narrow radiological considerations (IAEA, 2006). With these considerations in mind, there is a growing awareness that the anthropocentric assertion from 1977 should be questioned and is no longer sufficient (IUR, 2006).

One strategy being suggested for the protection of the environment from ionising radiation is to follow an approach coherent to that applied to radiological protection of humans (Pentreath, 1999; Strand *et al*, 2000; Holm, 2002). This approach would consist in defining endpoints and establishing dose-effect relationships for selected "reference" organisms, with the specification of either thresholds or limits at values that lead to effects deemed acceptable or negligible. While such an approach has its merits, there is also a risk arising from this necessarily focused approach in that it may lead to narrowly-defined regulatory compliance criteria that do not ensure effective environmental protection. In particular the approach may simply shift the monitoring of the environment from man to selected organisms designated by man on the basis of criteria that are difficult to establish and scientifically defend (OECD/NEA, 2003).

To be effective, radiological protection of the environment has to be consistent with overarching concepts of environmental protection (OECD/NEA, 2007). The system must be integral, addressing all aspects of pollution. Thus radiological protection of the environment also implies consideration the abiotic part of the environment and whether is appropriate to continue to plan the systematic release of man-made radionuclides into the environment. More generally, environmental protection should be seen in the context of sustainable development, whereby it constitutes an integral part of the development process and cannot be considered in isolation from it. An ecosystem-based (or "ecocentric" approach), based on the preservation of ecosystems, would seem best suited to protecting the environment as a whole (Bréchignac, 2002).

THE DISPOSAL OF RADIOACTIVE WASTE AT SEA: A CASE STUDY

The general assumption about levels of radiation protection considered adequate to protect human individuals being generally sufficient to protect the environment, or more specifically populations of non-human species, came under scrutiny directly and relatively early on in the debate concerning the disposal of radioactive wastes at sea. The evolution of the debate concerning disposal of radioactive waste at sea usefully illustrates the transition from a narrow anthropocentric system of control to a more holistic ecosystem-based management approach considered necessary to protect the marine environment.

At about the same time as the 1977 ICRP statement, an Advisory Group made recommendations concerning the oceanographic and radiological basis for dumping of radioactive wastes at sea (IAEA, 1978). The IAEA has responsibility for this definition and recommendations under the Convention on the Prevention of Marine Pollution by the Dumping of Wastes and other Matter, 1972 (the "London Convention"). In the 1970s the focus in the London Convention was on defining acceptable levels of dumping at sea based on assessments of the "assimilative capacity" of the oceans. The core of the definition and recommendations were drawn up in light of considerations of constraints based on calculations of exposure to humans. With respect to radiation exposure of marine organisms, the Advisory group concluded:

> *"We consider that the radiation doses to marine organisms arising as a result of releases within these limits would not lead to significant adverse effects to populations as a whole."*

The extent of impact considered "tolerable" impact seems rather high, certainly by today's standards, as the experts also stated that:

> "*Even if dose rates, say in the dumping area… were high enough to kill all deep ocean organisms in that area, the fraction of the total population affected would be small and it is probable that any effect would be indistinguishable from natural mortality in the total population.*"

A later assessment showed that dumping could give rise to significant doses to marine species and that future revisions of the definition and recommendations would have to consider impacts on the marine ecosystem in setting limits for dumping (IAEA, 1988).

A moratorium on the dumping of all radioactive wastes was put in place in 1983 pending the completion of scientific and technical studies as well as studies on the wider political, legal, economic and social aspects of radioactive waste dumping at sea (Parmentier, 1999). Following completion of these studies, the Parties agreed in 1993 to amend the Annexes I and II to the London Convention to ban the dumping of all radioactive wastes.[1] Work on revising the London Convention continued and resulted in the adoption of the 1996 Protocol to the London Convention.[2] As a result, the option of dumping of radioactive wastes and other hazardous (non-radioactive) substances at sea no longer exists. The transformation of the London Convention has resulted in a system of control centred on protecting the environment by preventing the inputs by dumping of any material which, by its nature and properties, could give rise to harm to the marine environment. Management centred on a specific assessment based on the radiological consequences (largely to humans) has been replaced by a system of protection for the ecosystem as a whole.

A parallel trend has emerged also with respect to the strategy for radioactive discharges developed under the OSPAR Convention for Protection of the Marine Environment of the Northeast Atlantic (Pallemaerts, 2003). The objective of preventing pollution of the maritime area from ionising radiation is to be realised through progressive and substantial reductions of discharges, emissions and losses of radioactive substances so that additional concentrations in the marine environment are close to zero.

WHAT ARE ENVIRONMENTAL NGOS LOOKING FOR?

The ongoing work on developing a "reference organism" approach to radiological protection may contribute to a better understanding of the possible impacts of inputs of radioactivity into the environment. This is to be welcomed particularly in the context of assessing the impacts of past or ongoing releases to the environment. However there is concern that this approach may be too narrow and focused to be able to provide a framework for effective environmental protection. One concern is that a reference organism approach may prove inadequate to cover the full range of biodiversity at scales ranging from the genetic to that of the ecosystem. Related to this, is the concern that protection of ecosystems cannot be realised through a selective organism-based reference system. Put simply, "radiological protection of selected non-human biota" may not be synonymous to "radiological protection of the environment".

A reference organism approach may have a role to play as part of a system of radiological protection of the environment but it is not one on its own. The use of the term "environment protection" as a sort of short-hand should be avoided where a much narrower scope is intended. A more comprehensive approach is needed in order to provide a sufficient basis for developing an effective system for protection of the environment and a framework for decision-making concerning future nuclear activities. At the core of such a system would be an ecosystem-based and precautionary approach, drawing on developments and experience in environmental protection across a range of disciplines and industrial sectors.

There remains concern about the ultimate objective of the current initiatives in radiological protection of the environment. This concern arises in part by the adoption of objectives and principles by the international nuclear community that appear to subordinate protection of the environment to the goal of ensuring ongoing development of nuclear power. For example:

[1] This legally binding prohibition entered into force on 20 February 1994.
[2] The 1996 Protocol entered into force on 24 March 2006.

> *This fundamental safety objective of protecting ... the environment has to be achieved without unduly limiting the operation of facilities or the conduct of activities that give rise to radiation risks* (IAEA, 2006).

To environmental NGOs this statement appears completely back-to-front and is simply wrong. To be sustainable, any future nuclear developments would need to be undertaken fully within the framework of an integrated, holistic system of environmental protection. If they cannot meet the required standards, then it is the nuclear programmes that should be curtailed, not the protection of the environment.

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